Clean Amended Claims

1. (Once Amended) A method for characterizing a surface contribution to an object's appearance; the method comprising determining from the object surface reflection values $k_1(w,h,i)$, from a plurality of reflectance values $R_m(w,h,i)$ which are established for at least one light frequency (w) and a plurality of combinations of viewing (h) and illumination (i) angles.

2. (Once Amended) The method according to claim 1 wherein the surface reflection values $k_1(w,h,i)$, are calculated from at least two different reflectance values $R_m(w,h,i)$ established for a predetermined combination of viewing and illumination angles using directional light.

3. (Once Amended) The method of claim 1 wherein $k_1(w,h,i)$ values are calculated from idealized reflectance value(s) $R_i(w)$ for light frequency or frequencies (w), and the measured reflectance values $R_m(w,h,i)$ using a color theory equation.

4. (Once Amended) The method of Claim 3 wherein the color theory equation has been assumed to be independent of the viewing and illumination angles and defines a relation between the idealized reflectance value(s) $R_i(w)$, a viewing and illumination angle-independent surface reflection value(s) $k_1(w)$, and reflectance value(s) $R_m(w)$ which are measurable independently of the viewing and illumination angles, with $k_1(w,h,i)$ being calculated by substituting one occurrence of $k_1(w)$ with $k_1(w,h,i)$ and replacing $R_m(w)$ with $R_m(w,h,i)$ in this equation, and subsequently calculating $k_1(w,h,i)$ from this equation.

5. (Once Amended) The method of claim 4 characterized in that each surface reflection value $k_1(w,h,i)$ is calculated by solving $k_1(w,h,i)$ from said equation for each value of $R_m(w,h,i)$ and the value(s) of $R_i(w)$.

6. (Original) The method of claim 4 wherein the object has a black color.

7. (Once Amended) A method for predicting an appearance of an object wherein the method comprises predicting the appearance of the object at predetermined viewing (h) and illumination (i) angles and at least one light frequency (w) based on color determining parameters of the material from which the object is

manufactured and a plurality of surface reflection values $k_1(w,h,i)$ that represent a surface contribution to the appearance for a predetermined plurality of combinations of viewing and illumination angles and at least one light frequency (w).

8. (Once Amended) The method according to claim 7 wherein, an idealized reflectance value $R_i(w)$ of the object is calculated based on the color determining parameters of the material from which the object is manufactured and subsequently a prediction of observed appearances for the object as viewed at a plurality of combinations of viewing and illumination angle(s) by calculating a plurality of reflectance values $R_p(w,h,i)$ using the viewing and illumination angle(s), the reflectance value $R_p(w,h,i)$ being calculated using an equation from a color theory, the equation being assumed to be independent of the viewing and illumination angles and defining a relation between the idealized reflectance value $R_i(w)$, an angle-independent surface reflection $k_1(w)$ and an angle-independent reflectance value $R_p(w)$, with $R_p(w,h,i)$ being calculated at a combination of viewing and illumination angles and by setting $R_p(w,h,i)$ equal to $R_p(w)$ and replacing one $k_1(w)$ with $k_1(w,h,i)$ in this equation and by subsequently solving $R_p(w,h,i)$ from this equation using the idealized reflectance $R_i(w)$ and the surface reflection $k_1(w,h,i)$.

9. (Once Amended) The method according to claim 8 wherein the values of $k_1(w,h,i)$ are determined from a test object manufactured from a material and with a surface texture corresponding to the kind of material and predetermined surface texture of a sample object to be made in a later stage.

10. (Once Amended) The method according claim 9 wherein an appearance of the sample object is predicted at a plurality of combinations of predetermined viewing and illumination angles based on the color determining parameters of the material from which the sample object is manufactured and the plurality of reflection values $k_1(w,h,i)$ obtained from the test object for a plurality of combinations of viewing and illumination angles.

11. (Once Amended) The method according to claim 10 wherein the plurality of surface reflection values $k_1(w,h,i)$ obtained from the test object are respectively

determined from a plurality of corresponding reflectance values $R_m(w,h,i)$ of the test object.

12. (Original) The method of claim 11 wherein the test object has a black color.

13. (Once Amended) A method for matching an appearance of an object with a reference object; the method comprising the steps of:

(a) measuring or otherwise selecting reflectance values $Rm_{ref}(w,h,i)$ of the reference object using at least one light of frequency (w) and a plurality of predetermined viewing angles (h) and illumination angles (i);

(b) measuring reflectance values $R_{mtest}(w,h,i)$ of a test object manufactured by a pre-selected method from a pre-selected material having a pre-selected amount and type of colorant(s) and/or other additive(s);

(c) calculating values for a surface contribution to appearance $k_1(w,h,i)$ of the test object from reflectance values $Rm_{test}(w,h,i)$;

(d) making a sample object with predicted reflectance values $R_p(w,h,i)$ by selecting a surface texture similar to that of the test object and characterized by $k_1(w,h,i)$ values and a composition such that $R_p(w,h,i)$ values that are predicted to be similar to $Rm_{ref}(w,h,i)$ values;

(e) comparing the reflectance values measured on the sample object from step (d) with those the reference object; and

(f) repeating, as desired, steps (b), (c), (d), and (e) changing the surface texture the amount or type of colorants, other additives or manufacturing process until the appearance match between the first and second object is acceptable.

14. (Once Amended) The method according to claim 13 wherein the test object in step (b) has a black color.

15. (Once Amended) The method of claim 13 wherein the surface reflection values $k_1(w,h,i)$ of the test object are determined based on a preselected material and surface texture.

16. (Once Amended) The method according to claim 13 wherein a test object is manufactured from a preselected material and surface texture and the value(s)

$k_1(w,h,i)$ for the viewing and illumination angle(s) is calculated by solving $k_1(w,h,i)$ for each value of $R_m(w,h,i)$ and an idealized reflectance value $R_i(w)$ from a color theory equation that has been assumed to be independent of viewing and illumination angles and that defines a relation between $R_i(w)$, a viewing and illumination angle-independent surface reflection $k_i(w)$, and a reflectance value $R_m(w)$ which is measurable independently of the viewing and illumination angles, where $k_1(w,h,i)$ substitute for $k_i(w)$ in one occurrence and $R_m(w)$ is replaced by $R_m(w,h,i)$ in the equation.

17. (Once Amended) The method according to claim 13 wherein the surface reflection values $k_1(w,h,i)$ do not change in step (f).

18. (Once Amended) The method according to claim 13 wherein the material does not change in step (f).

19. (Cancel)

20. (Once Amended) The method of claim 13 wherein:

step (c) comprises the steps of calculating an idealized reflectance value $R_i(w)$ of the test object using an equation from a color theory, independent of the viewing and illumination angles h,i, using color determining parameters of the material from which the test object is manufactured that are dictated by what material and added colorants and/or other additives comprise the test object, and

step (d) comprises calculating $R_p(w,h,i,)$ using an equation from a color theory, which equation has been assumed to be independent of the viewing and illumination angles and that defines a relation between the idealized reflectance value(s) $R_i(w)$, angle-independent surface reflection value(s) $k_1(w)$ and angle-independent reflectance value(s) $R_p(w)$ such as it would be measured, with $R_p(w,h,i)$ being determined using this equation by setting $R_p(w,h,i)$ equal to $R_p(w)$ and one $k_1(w)$ is changed to $k_1(w,h,i)$ in this equation and by subsequently solving $R_p(w,h,i)$ from this equation on the basis of the idealized reflectance value(s) $R_i(w)$ and the surface reflection $k_1(w,h,i)$.

21. (Once Amended) The method of claim 20 wherein the color determining parameters are calculated from absorption coefficient K_{pol} and scattering coefficient S_{pol} of a polymer comprising an object and absorption coefficient K_{pig} and scattering coefficient S_{pig} of colorants and/or other additives comprising an object, wherein the object is the test object for step (c) and the sample object for step (d).

22. (Once Amended) The method of claim 20 wherein the $R_{rmref}(w,h,i)$ values are determined from a reference object.

23. (Once Amended) The method of claim 20 wherein the method is carried out for a plurality or a range of values for the frequency (w).

24. (Once Amended) The method of claim 13 wherein the sample object is transparent or translucent.

25. (Cancel)